

JAI HIND COLLEGE AUTONOMOUS



Syllabus for F.Y.BSc

Course : Physics

Semester : I

Credit Based Semester & Grading System

With effect from Academic Year 2018-19

List of Courses

Course: Physics

Semester: I

SR. NO.	COURSE CODE	COURSE TITLE	NO. OF LECTURES / WEEK	NO. OF CREDITS
FYBSC				
1	SPHY101	Mechanics and Thermodynamics- I	3	2
2	SPHY102	Vector Calculus- I and Modern Physics	3	2
3	SPHY1PR	Practical-I	6	2

Semester I – Theory

Course: SPHY101	Course Title: Mechanics and Thermodynamics- I (Credits :02 Lectures/Week:03)	
	Objectives: <ul style="list-style-type: none"> ➤ To understand applications of Newton's laws to classical systems. ➤ Understand the concepts of elasticity and viscosity ➤ Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process. Outcomes: To study the fundamentals of Mechanics and Thermodynamics.	
Unit I	Newton's laws of motion Newton's first and second law and their explanation, Working with Newton's first and second law, Newton's third law and its explanation Applying Newton's laws Using Newton's first law: Particles in equilibrium, Using Newton's second law: Dynamics of particles, Frictional forces, Dynamics of circular motion, The fundamental forces of nature Work and Energy Kinetic energy, Work and work energy theorem, Calculation of work done with Constant force, Variable force, Illustration, Conservative and nonconservative forces	15 L
Unit II	Elasticity: Review of Elastic constants Y , K , η and σ ; Equivalence of shear strain to compression and extension strains. Relations between elastic constants, Couple for twist in cylinder Fluid Dynamics: Equation of continuity, Bernoulli's equation, applications of Bernoulli's equation, streamline and turbulent flow, lines of flow in airfoil, Poiseuille's equation	15 L
Unit III	Thermodynamics: Behavior of real gases and real gas equation, Van der Waal equation Thermodynamic Systems, Zeroth law of thermodynamics, Concept of Heat, The first law, Non Adiabatic process and Heat as a path function, Internal energy, Heat Capacity and specific heat, Applications of first law to simple processes, general relations from the first law, Indicator diagrams, Work done during isothermal and adiabatic processes, Worked examples, Problems.	15 L
Textbook: <ol style="list-style-type: none"> 1. Degree Physics for Science and Engineering, B. K. Guha, (2007), Asian Books private limited. 2. Fundamental of Physics (extended), Halliday, Resnick and Walker, (9th Edition 2010), John Wiley and Sons. 3. Mechanics, (2nd Edition 2008), H.S. Hans and S.P. Puri, Tata McGraw Hill. 4. Thermal Physics, A. B. Gupta, H. Roy, (2009), Tata McGraw Hill. 5. Concepts of Physics (Part I), H. C. Verma, (2002), Bharati Bhavan Publishers. 6. Heat Thermodynamics and Statistical Physics, Brijlal, Subramanyam and Hemne, (Multi-coloured, 2007), S. Chand publications. 		

Evaluation Scheme

[A] Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 Marks

(i) C.A.-I : Test – 20 Marks of 40 mins. duration

(ii) C.A.-II : Type Name (Problem Solving/ Seminars)

II. Semester End Examination (SEE)- 60 Marks



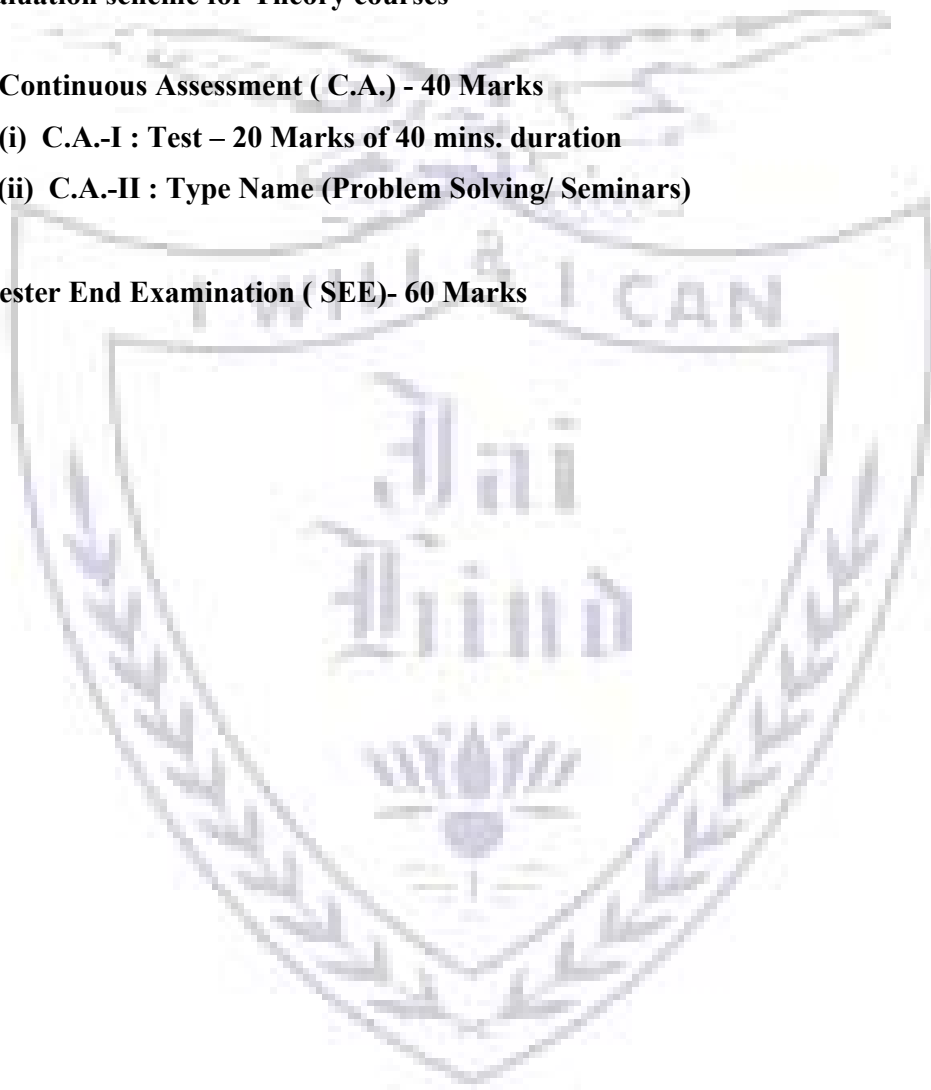
Course: SPHY102	Course Title: Vector Calculus- I and Modern Physics (Credits :02 Lectures/Week:03)	
	Objectives: <ul style="list-style-type: none"> ➤ Understand the basic mathematical concepts and their applications in physical situations. ➤ Develop quantitative problem solving skills in all the topics covered. ➤ Understand nuclear properties. ➤ Understand basic concepts of quantum. Outcomes: To study the basics of Mathematical Physics and to introduce concepts of modern physics	
Unit I	Vector Algebra: Vectors, Scalars, Vector algebra, Laws of Vector algebra, Unit vector, Rectangular unit vectors, Components of a vector, Scalar fields, Vector fields, Problems based on Vector algebra. Dot or Scalar product, Cross or Vector product, Commutative and Distributive Laws, Scalar Triple product, Vector Triple product (Omit proofs). Problems and applications based on Dot, Cross and Triple products. Vector Calculus: Gradient, divergence and curl: The ∇ operator, Definitions and physical significance of Gradient, Divergence and Curl; Distributive Laws for Gradient, Divergence and Curl (Omit proofs); Problems based on Gradient, Divergence and Curl	15 L
Unit II	Structure of Nuclei: Basic properties of nuclei, Composition, Charge, Size, Rutherford's expt. for estimation of nuclear size, density of nucleus, Mass defect and Binding energy, Packing fraction, BE/A vs A plot, stability of nuclei (N Vs Z plot) and problems. Radioactivity: Radioactive disintegration concept of natural and artificial radioactivity, Properties of α , β , γ -rays, laws of radioactive decay, half-life, mean life (derivation not required), units of radioactivity, successive disintegration and equilibriums, radioisotopes. Numerical Problems.	15 L
Unit III	Introduction to Quantum theory: Black body (definition), Black Body spectrum, Wien's displacement law, Matter waves, wave particle duality, Heisenberg's uncertainty Principle. Davisson-Germer experiment, G. P. Thompson experiment. X-Rays: Production and properties. Continuous and characteristic X-Ray spectra, X-Ray Diffraction, Bragg's Law, Applications of X-Rays. Interaction of photon with matter: Compton Effect, Pair production, Photons and Gravity, Gravitational Red Shift.	15 L

Textbook:

1. Binoy Bhattacharya, (2010), Mathematical Physics, New Central Book Agency.
2. Dr. S. B. Patel, (Reprint 2009) ,Nuclear physics, New Age International Pvt Ltd Publishers.
3. A. Beiser, (2017), Concepts of Modern Physics, McGraw Hill Education

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II. Semester End Examination (SEE)- 60 Marks

Semester I – Practical

Course: SPHY1PR	Practical Title: Web designing and Programming Practical (Credits : 2Practicals/Week: 06)
	Skills <ol style="list-style-type: none">1. Use of Vernier caliper, micrometer screw gauge2. Use of spectrometer3. Use of Travelling microscope4. Estimation of errors and graph plotting Experiments (Any 8) <ol style="list-style-type: none">1. Torsional oscillations2. Bifilar pendulum3. Angle of prism<ol style="list-style-type: none">1. Y by vibrations2. Surface tension by capillary rise3. Refractive index of material of prism4. Coefficient of viscosity by Poiseuille's method5. CVAT6. Flywheel7. Flat spiral spring8. Thermocouple

Evaluation Scheme

[B] Evaluation scheme for Practical courses: 50marks/paper

I. PEC(Rough Manual Journal) -20Marks

II. Practical Exam (30 Marks)